# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005

JAS-ANZ BSCIC ISO 9001 REGISTERED


Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2015-16

16.05.2015

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Customer** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
#385, Bettaulsur (P), Bangalore Nort Taluk.

**Name of Work** : Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015

Date of Testing : 16.05.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 120 | 120 | 2.4 | 97.6 | 95-100 |
| 22.4 | 1545 | 1665 | 33.3 | 66.7 | 60-80 |
| 11.2 | 1120 | 2785 | 55.7 | 44.3 | 40-60 |
| 4.75 | 675 | 3460 | 69.2 | 30.8 | 25-40 |
| 2.36 | 520 | 3980 | 79.6 | 20.4 | 15-30 |
| 0.600 | 415 | 4395 | 87.9 | 12.1 | 8-22 |
| 0.075 | 365 | 4760 | 95.2 | 4.8 | 0-8 |

**Note:**

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Civil Tech Consultants & Engineers Bangalore

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*Civil-tech Consultants & Engineers*
*#23/14, 7th Cross 3rd Stage 4th Block,*
*Shakth Ganapathinagar,*
*Basaveshwaranagar, Bangalore-560 079.*


#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.
Tele Fax : 23223227, Website : www.civiltechconsultants.com
E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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## GRADATION FOR WMM
## MORTH TABLE-400-11

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**Agency** : **Mr. B.B. Umesh,**
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**Reference** : EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015

Date of Testing : 16.05.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 110 | 110 | 2.2 | 97.8 | 95-100 |
| 22.4 | 1525 | 1635 | 32.7 | 67.3 | 60-80 |
| 11.2 | 1140 | 2775 | 55.5 | 44.5 | 40-60 |
| 4.75 | 625 | 3400 | 68.0 | 32.0 | 25-40 |
| 2.36 | 570 | 3970 | 79.4 | 20.6 | 15-30 |
| 0.600 | 355 | 4325 | 86.5 | 13.5 | 8-22 |
| 0.075 | 470 | 4795 | 95.9 | 4.1 | 0-8 |

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2015-16 16.05.2015

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Customer** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
#385, Bettaulsur (P), Bangalore Nort Taluk.

**Name of Work** : Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015

Date of Testing : 16.05.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 115 | 115 | 2.3 | 97.7 | 95-100 |
| 22.4 | 1750 | 1865 | 37.3 | 62.7 | 60-80 |
| 11.2 | 1045 | 2910 | 58.2 | 41.8 | 40-60 |
| 4.75 | 625 | 3535 | 70.7 | 29.3 | 25-40 |
| 2.36 | 580 | 4115 | 82.3 | 17.7 | 15-30 |
| 0.600 | 320 | 4435 | 88.7 | 11.3 | 8-22 |
| 0.075 | 415 | 4850 | 97.0 | 3.0 | 0-8 |

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## GRADATION FOR WMM
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**Agency** : **Mr. B.B. Umesh,**
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**Reference** : EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015

Date of Testing : 16.05.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 100 | 100 | 2.0 | 98.0 | 95-100 |
| 22.4 | 1645 | 1745 | 34.9 | 65.1 | 60-80 |
| 11.2 | 1125 | 2870 | 57.4 | 42.6 | 40-60 |
| 4.75 | 615 | 3485 | 69.7 | 30.3 | 25-40 |
| 2.36 | 550 | 4035 | 80.7 | 19.3 | 15-30 |
| 0.600 | 345 | 4380 | 87.6 | 12.4 | 8-22 |
| 0.075 | 430 | 4810 | 96.2 | 3.8 | 0-8 |

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/AIV/2015-16

16.05.2015

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,**<br>#385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Source / Location** | WMM Plant |
| **Type of Mix** | Wet Mix macadam |
| **Date of Testing** | 16.05.2015 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 388 | 384 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 87 | 82 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 301 | 302 | |
| 4 | Aggregate Impact value = percent fines | 22.42 | 21.35 | |
| | 100* ($W_2/W_1$)% | | | **21.89** |

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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16.05.2015

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,**<br>#385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Source / Location** | WMM Plant |
| **Type of Mix** | Wet Mix macadam |
| **Date of Testing** | 16.05.2015 |

| Sl No. | Details | Trial No. | | Average |
|---|---|---|---|---|
| | | 1 | 2 | |
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 389 | 386 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 86 | 87 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 303 | 299 | |
| 4 | Aggregate Impact value = percent fines | 22.11 | 22.54 | |
| | 100* ($W_2/W_1$)% | | | 22.32 |

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/S-T/2015-16 16.05.2015

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Customer | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| Name of Work | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011) |
| Type of Mix | Wet Mix Macadam |
| Date of Testing | 16.05.2015 |

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.84%**

Elongation Index = **13.63%**

**Result : Combined Flakiness & Elongation index 25.47%**

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/S-T/2015-16 16.05.2015

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Customer | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| Name of Work | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011) |
| Type of Mix | Wet Mix Macadam |
| Date of Testing | 16.05.2015 |

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.75%**

Elongation Index = **13.74%**

**Result : Combined Flakiness & Elongation index 25.49%**

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377


Job No: CTCE/BBMP/W.No.09/BBU/CSR-06/878c/SDBC(QB)/2015-16 18.06.2015

## TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

| | | |
|---|---|---|
| *CUSTOMER | : | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| *AGENCY | : | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| *NAME OF THE WORK | : | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | : | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| *SAMPLE ID | : | Bitumen |
| DATE OF SAMPLING | : | 16.06.2015 |
| PERIOD OF TESTING | : | 18.06.2015 |

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

| Sl. No | Description | Test Method as per IS | Test Result | Requirement as per IS:73:2013 |
|---|---|---|---|---|
| 1 | Penetration at 25 $^0$C, 1/10 mm | IS :1203 -1978 (RA-2009) | 93 | 80 to 100 |
| 2 | Softening point, $^0$C | IS :1205 -1978 (RA-2009) | 46 | Min. 40 |
| 3 | Ductility at 27$^0$C, cm | IS :1208 -1978 (RA-2009) | 100 > | Min. 75 |
| 4 | Flash Point, $^0$C | IS :1209 -1978 (RA-2009) | 296 | Min. 220 |

*Information is furnished by the Customer/Representative.

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VIDYARANI P.K.
Technical Manager


#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.
Tele Fax : 23223227, Website : www.civiltechconsultants.com
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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/AIV/2015-16 18.06.2015

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 18.06.2015 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 385 | 389 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 87 | 85 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 298 | 304 | |
| 4 | Aggregate Impact value = percent fines<br>100* ($W_2/W_1$)% | 22.60 | 21.85 | 22.22 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 18.06.2015 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 385 | 387 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 85 | 82 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 300 | 305 | |
| 4 | Aggregate Impact value = percent fines 100* ($W_2/W_1$)% | 22.08 | 21.19 | **21.63** |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Shape_T/2015-16 18.06.2015

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Customer | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| Name of Work | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 18.06.2015 |

Result : Flakiness Index = **11.84%**

Elongation Index = **13.62%**

Result : Combined Flakiness & Elongation index **25.46%**

Civil-Tech Consultants & Engineers Bangalore

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Shape_T/2015-16 18.06.2015

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

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|---|---|
| Customer | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| Name of Work | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 18.06.2015 |

Result : Flakiness Index = **12.47%**

Elongation Index = **13.96%**

Result : Combined Flakiness & Elongation index **26.43%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

**Note:**

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Stripping/2015-16 20.06.2015

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 20.06.2015 |

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|---|---|---|---|
| 1 | 3.2 | 3.33 | 96.67 |
| 2 | 3.3 | | |
| 3 | 3.5 | | |

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Sp_Wa/2015-16 20.06.2015

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Source / Location** | Hotmix Plant, Bangalore |
| **Date of Testing** | 20.06.2015 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2025 | 2027 | 2026 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 750 | 750 | 750 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_s$ g | 1275 | 1277 | 1276 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2017 | 2014 | 2015 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 742 | 737 | 739 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 2002 | 2000 | 1999 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.698 | 2.714 | 2.705 | 2.706 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.754 | 2.766 | 2.765 | 2.762 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.75% | 0.70% | 0.80% | 0.75% |

**Comments:**

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2015-16 20.06.2015

## BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

**AS per IRC : SP : 11 - 1984**

| | |
|---|---|
| CUSTOMER | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| AGENCY | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| NAME OF THE WORK | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| SAMPLE I/D | Roads at Sapthagiri Layout Ward No.09 |
| DATE OF TESTING | 20.06.2015 |

### BITUMEN CONTENT DETERMINATION

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 475 | 474 |
| 3. Weight of Asphalt and Mineral matter Extracted, g | - | - |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | | |
| 6. Weight of Bitumen Extracted, g. (corrected) | 25 | 26.00 |
| 7. Bitumen content in % | 5.00 | 5.20 |
| 8. Average | **5.10** | |

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2015-16 20.06.2015

## GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

**As per IS : 2386 and IRC : SP : 11 - 1984**

| | |
|---|---|
| CUSTOMER | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| AGENCY | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| NAME OF THE WORK | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, |
| REFERENCE | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| SAMPLE I/D | Roads at Sapthagiri Layout Ward No.09 |
| DATE OF TESTING | 20.06.2015 |

**GRADATION AFTER EXTRACTION**

| Sieve Size in mm | Trail 1 | | | | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|---|---|---|---|---|---|
| | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 23.25 | 4.89 | 4.89 | 95.11 | 90-100 |
| 4.75 | 254.6 | 53.60 | 58.49 | 41.51 | 35-51 |
| 2.36 | 52.15 | 10.98 | 69.47 | 30.53 | 24-39 |
| 1.18 | 48.74 | 10.26 | 79.73 | 20.27 | 15-30 |
| 0.3 | 29.56 | 6.22 | 85.96 | 14.04 | 9-19 |
| 0.075 | 35.23 | 7.42 | 93.37 | 6.63 | 3-8 |

| Sieve Size in mm | Trail 2 | | | | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|---|---|---|---|---|---|
| | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 33.26 | 7.02 | 7.02 | 92.98 | 90-100 |
| 4.75 | 261.4 | 55.15 | 62.16 | 37.84 | 35-51 |
| 2.36 | 52.45 | 11.07 | 73.23 | 26.77 | 24-39 |
| 1.18 | 45.82 | 9.67 | 82.90 | 17.10 | 15-30 |
| 0.3 | 22.63 | 4.77 | 87.67 | 12.33 | 9-19 |
| 0.075 | 28.56 | 6.03 | 93.70 | 6.30 | 3-8 |

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/AGG/2016-17 20.06.2015

## Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| **Customer** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk. |
| **Name of the Work** | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Sample I / D** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete (SDBC) |
| **Date of Testing** | 20.06.2015 |

Total Weight of Sample: **5200** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade-II MORTH specification |
| 9.5 | 325 | 6.3 | 6.25 | 93.75 | 90-100 | |
| 4.75 | 2740 | 52.7 | 58.94 | 41.06 | 35-51 | |
| 2.36 | 645 | 12.4 | 71.35 | 28.65 | 24-39 | |
| 1.18 | 475 | 9.1 | 80.48 | 19.52 | 15-30 | |
| 0.3 | 355 | 6.8 | 87.31 | 12.69 | 9-19 | |
| 0.075 | 320 | 6.2 | 93.46 | 6.54 | 3-8 | |

Total Weight of Sample: **5300** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 13.2 | 0 | 0.0 | 0 | 100 | 100 | Gradation satisfies Grade-II MORTH specification |
| 9.5 | 315 | 5.9 | 5.94 | 94.06 | 90-100 | |
| 4.75 | 2685 | 50.7 | 56.60 | 43.40 | 35-51 | |
| 2.36 | 565 | 10.7 | 67.26 | 32.74 | 24-39 | |
| 1.18 | 490 | 9.2 | 76.51 | 23.49 | 15-30 | |
| 0.3 | 455 | 8.6 | 85.09 | 14.91 | 9-19 | |
| 0.075 | 425 | 8.0 | 93.11 | 6.89 | 3-8 | |

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Stability/2015-16 20.06.2015

## TEST REPORT ON STABILITY OF MIX

| | | |
|---|---|---|
| **Customer** | : | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | : | **Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore Nort Taluk. |
| **Name of the Work** | : | Improvements and Asphalting to Sapthagiri Layout 5th, 6th, 7th and 8th cross roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | : | EE/BTP/BBMP/E-PMT/10(16716)WO/37/2015-16 Dated: 22.04.2015 |
| **Source of location** | : | Hot mix Plant, Bangalore |
| **Type of Mix** | : | Semi Dense Bituminous Concrete |
| **Date of Testing** | : | 20.06.2015 |

The results of the tests conducted on the Semi Dense bituminous concrete mix sample are as follows:

| Sl. No | Description | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-16) |
|---|---|---|---|---|
| 1 | Marshal Stability, Kn | 9.25 | 9.50 | 8.2 Kn (min) |
| 2 | Marshal flow, mm | 3.40 | 3.55 | 2 – 4 |
| 3 | Percent air voids in Mineral Aggregate | 3.65 | 3.85 | 3 – 5 |
| 4 | Voids in Compacted Mix | 13.30 | 13.15 | 13 – 15 |
| 5 | Percent Voids filled with Bitumen | 67.50 | 68.65 | 65 - 78 |
| 6 | Density, g/cc | 2.26 | 2.27 | -- |

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